

VALVE STEM OIL SEAL AND VALVE SPRING REPLACEMENT

Special Tools

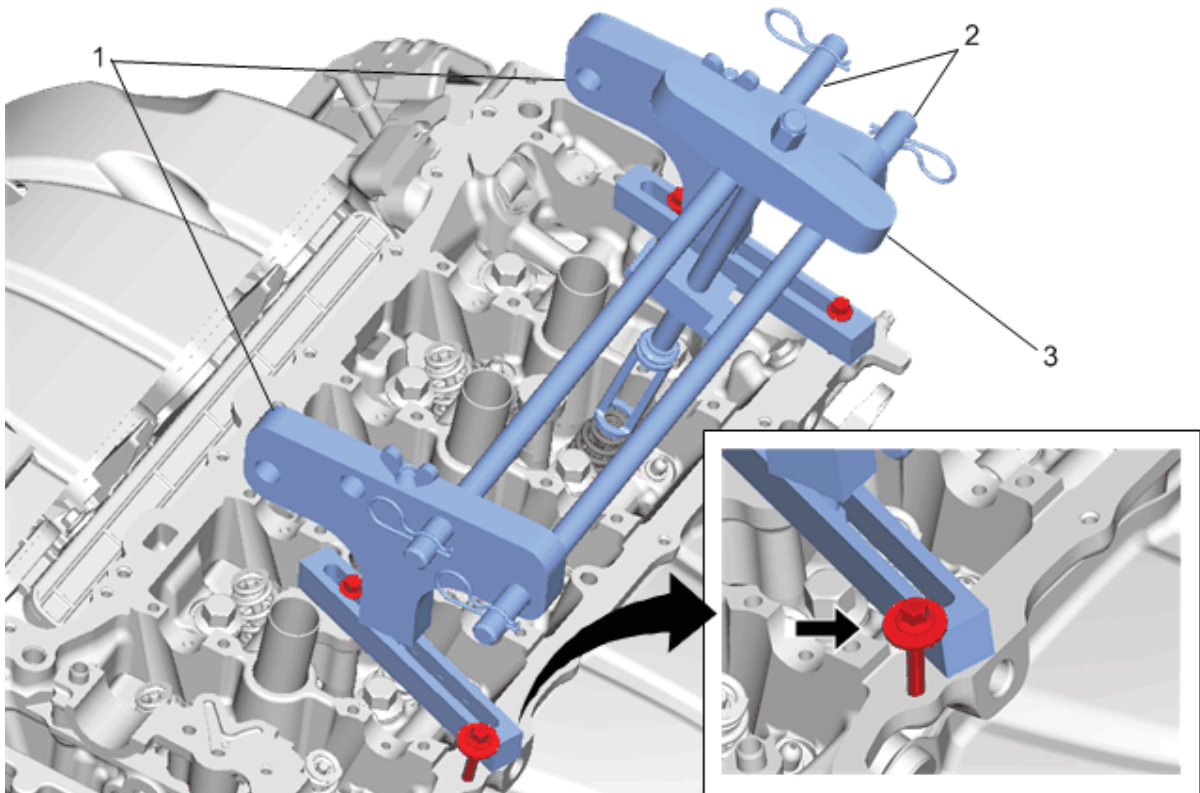
- EN-37281-A Valve Guide Seal Remover
- EN-50717 Valve Spring Compressor
- EN-50792 Flywheel Holding Tool

For equivalent regional tools refer to [Special Tools](#) .

Removal Procedure

NOTE: Prevent the crankshaft from rotating clockwise or counterclockwise before using compressed air in the cylinder. Rotation of the crankshaft may cause damage to EN-50792 Flywheel Holding Tool .

1. If equipped with a manual transmission, leave the transmission in first gear with the vehicle on the ground and the parking brake set.
2. If equipped with an automatic transmission, remove the starter. Refer to [Starter Replacement \(LGX\)](#), [Starter Replacement \(LCV, LTG\)](#), [Starter Replacement \(LF4 - Manual Transmission\)](#), [Starter Replacement \(LF4 - Automatic Transmission\)](#) .
3. Install EN-50792 Flywheel Holding Tool.
4. Remove the camshaft. Refer to [Camshaft Position Actuator and Camshaft Replacement - Intake](#), or [Camshaft Position Actuator and Camshaft Replacement - Exhaust](#).



NOTE: When mounting the valve spring compressor to the cylinder head, a suitable large washer should be used as indicated by the arrow.

5. Install the **EN-50717** Valve Spring Compressor (1) to the front and rear of the cylinder head as shown.
6. Install the cross bars and locks (2) of the **EN-50717** Valve Spring Compressor to the valve spring compressor adaptors.
7. Remove the spark plugs. Refer to [Spark Plug Replacement](#) .
8. Install an air hose adapter into the spark plug hole.
9. Attach an air hose to the adapter and pressurize the cylinder to 690 kPa (100 psi).
10. Compress the valve spring using the valve spring compressor (3).

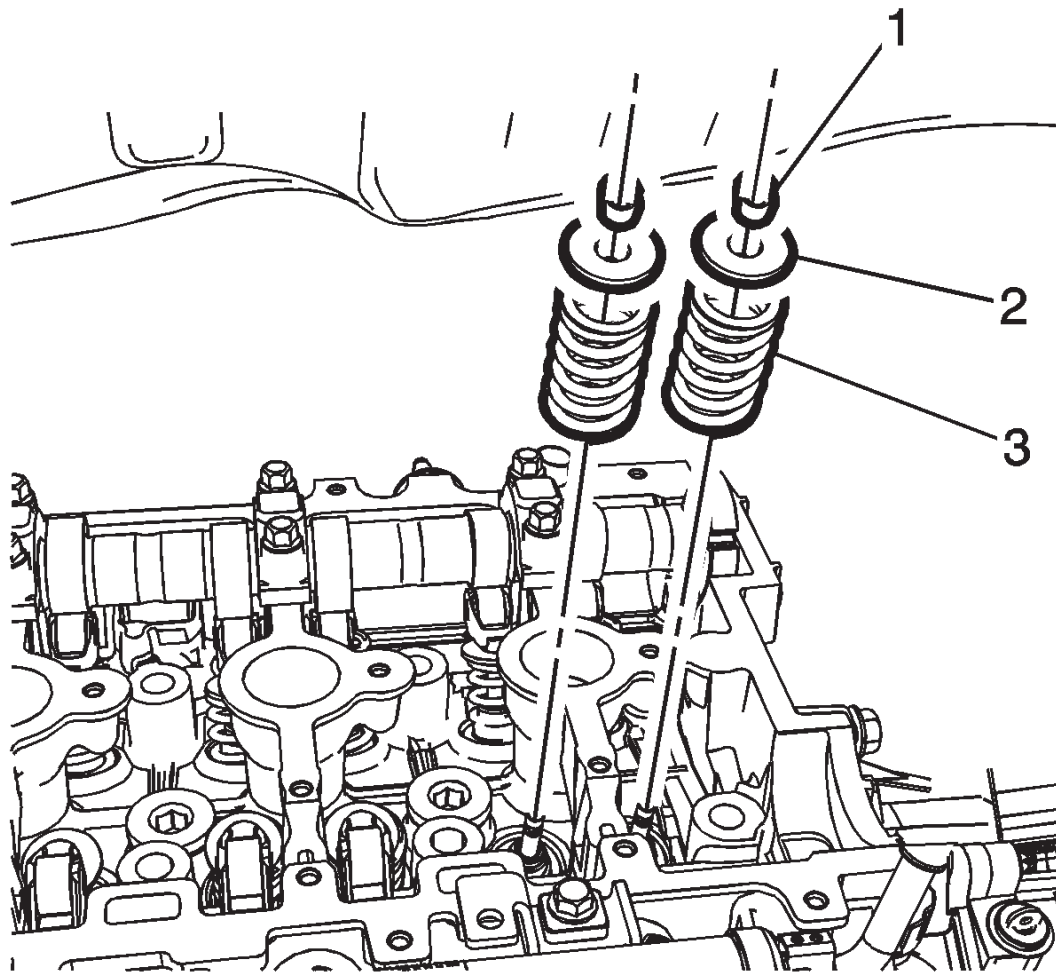


Fig. 180: Valve Spring, Keepers And Retainer
Courtesy of GENERAL MOTORS COMPANY

11. Remove the valve spring keepers (1).
12. Remove the valve spring (3) and retainer (2).
13. Use the **EN-37281-A** Valve Guide Seal Remover to remove the valve seal.

Installation Procedure

1. Using the **EN-37281-A** Valve Guide Seal Remover , install the NEW valve seal. Fully seat the seal onto the valve guide.

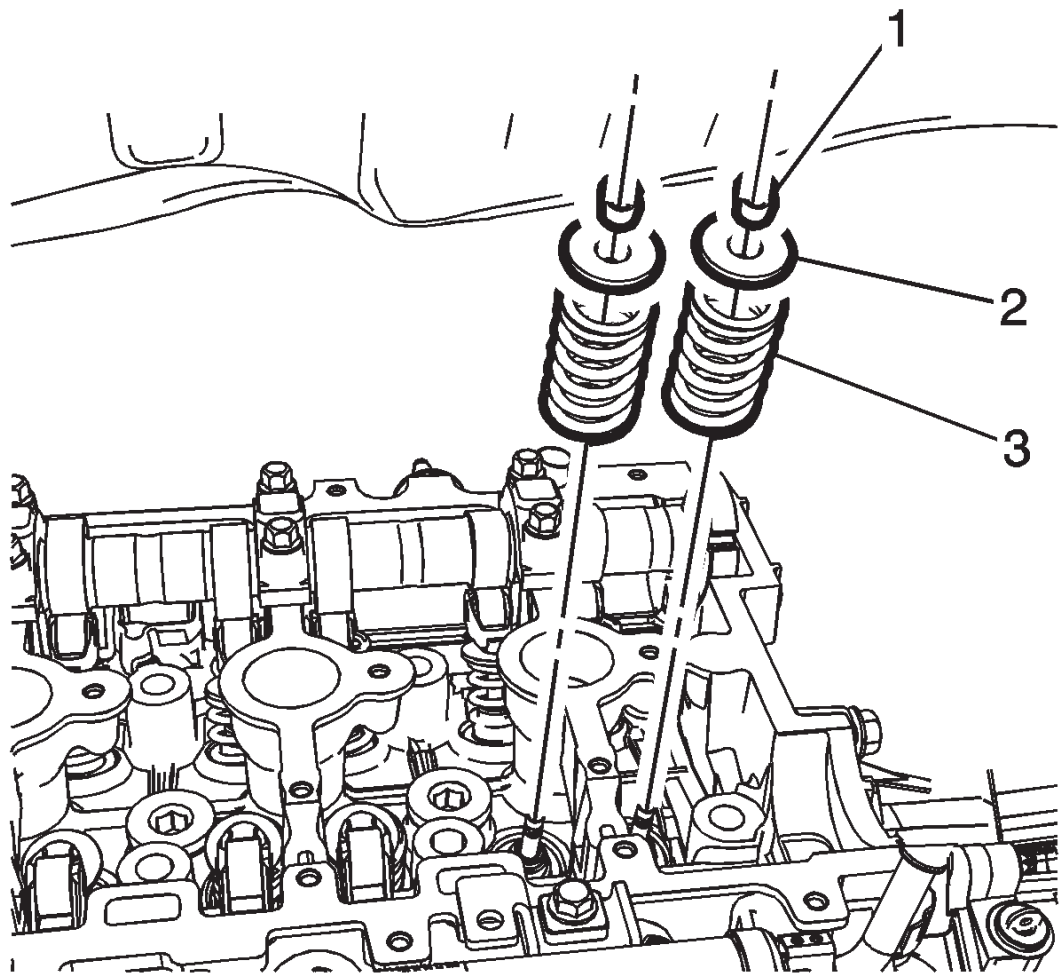
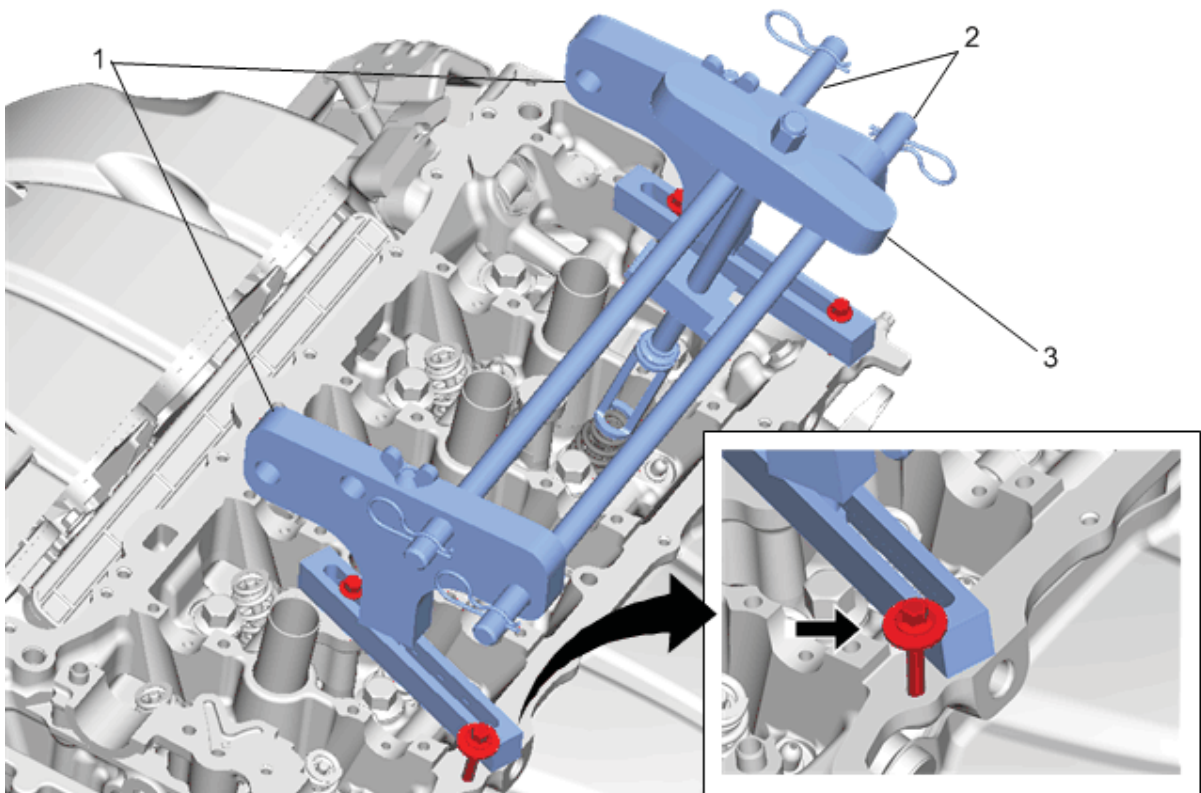


Fig. 181: Valve Spring, Keepers And Retainer
Courtesy of GENERAL MOTORS COMPANY

2. Install the valve spring (3) and retainer (2).
3. Compress the valve spring using the valve spring compressor.
4. Install the valve spring keepers (1).
5. Disconnect the air hose and air hose adapter.



6. Remove the EN-50717 Valve Spring Compressor and EN-50717 Valve Spring Compressor adapter set from the cylinder head.
7. Install the spark plugs. Refer to [Spark Plug Replacement](#) .
8. Install the camshaft. Refer to [Camshaft Position Actuator and Camshaft Replacement - Intake](#), or [Camshaft Position Actuator and Camshaft Replacement - Exhaust](#).
9. Remove the EN-50792 Flywheel Holding Tool .
10. If equipped with an automatic transmission, install the starter. Refer to [Starter Replacement \(LGX\)](#), [Starter Replacement \(LCV, LTG\)](#), [Starter Replacement \(LF4 - Manual Transmission\)](#), [Starter Replacement \(LF4 - Automatic Transmission\)](#) .

CYLINDER HEAD REPLACEMENT

Removal Procedure

Special Tools

- EN 38188 Cylinder Head Broken Bolt Extractor Kit - or equivalent aftermarket tool
- EN 45059 Angle Meter

For equivalent regional tools, refer to [Special Tools](#) .

1. Drain the coolant system. Refer to [Cooling System Draining and Filling \(Static\)](#), [Cooling System Draining and Filling \(GE 47716\)](#) .
2. Drain the engine oil. Refer to [Engine Oil and Oil Filter Replacement](#).
3. Remove the camshaft cover. Refer to [Camshaft Cover Replacement](#).
4. Remove the intake manifold. Refer to [Intake Manifold Replacement](#).
5. Remove the exhaust manifold. Refer to [Exhaust Manifold Replacement \(LCV\)](#), [Exhaust Manifold Replacement \(LTG\)](#) .
6. Remove the engine front cover. Refer to [Engine Front Cover Replacement](#).
7. Remove the camshaft timing chain and tensioner. Refer to [Camshaft Timing Chain and Tensioner Removal](#) .
8. Remove the fuel pump. Refer to [Fuel Pump Replacement](#) .
9. Remove the intake and exhaust camshafts. Refer to [Intake and Exhaust Camshaft, Bearing Cap, and Lash Adjuster Removal](#) .
10. Remove the ground wire bolt and wire at the left front of the cylinder head and reposition the harness retainer
11. Remove the 2 bolt and ground wires at the left rear of the cylinder head.
12. Disconnect the right camshaft position sensor electrical.
13. Disconnect the left camshaft position sensor electrical.
14. Disconnect the thermostat bypass hose from the water outlet housing.
15. Disconnect the heater hose from the water outlet housing.
16. Remove the water outlet housing bolts and housing.
17. Remove the water outlet housing seal.
18. Remove the injector fuel rail. Refer to [Fuel Injection Fuel Rail Assembly Replacement](#) .